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A Comparison of Awareness Training and Competing Response Training in the Treatment of Muscle Tics and Nervous Habits

Gregory A. Wright

Western Michigan University

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A COMPARISON OF AWARENESS TRAINING AND COMPETING RESPONSE TRAINING IN THE TREATMENT OF MUSCLE TICS AND NERVOUS HABITS

by

Gregory A. Wright

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Master of Arts
Department of Psychology

Western Michigan University
Kalamazoo, Michigan
August 1987
A COMPARISON OF AWARENESS TRAINING AND COMPETING RESPONSE
TRAINING IN THE TREATMENT OF MUSCLE TICS
AND NERVOUS HABITS

Gregory A. Wright, M.A.
Western Michigan University, 1987

This study examines two components of Azrin and Nunn's (1973) habit reversal procedure in an attempt to separate the effects of awareness training from the effects of competing response training. Research (Miltenberger, Fuqua, & McKinley, 1985) has indicated that an intervention combining awareness training and competing response practice is as effective as the entire habit reversal package in suppressing muscle tics. However, because the competing response component is always administered in conjunction with awareness training, the effects of each component are obscured. Four subjects, two with muscle tics and two with nervous habits, received an intervention of either awareness training alone or awareness training plus competing response training. Both interventions were effective in reducing or eliminating muscle tics and nervous habits, suggesting that a portion of the effect attributed to the competing response may be due to the awareness training component.
ACKNOWLEDGEMENTS

The support and encouragement of many individuals has made the execution and completion of this thesis possible. The list of persons whose contributions warrant acknowledgement is lengthy, but each contribution was significant, and each furthered the goals of this project.

First, I would like to gratefully acknowledge the support and guidance of my advisor, Dr. R. Wayne Fuqua, whose expertise was invaluable to me in carrying out this research and preparing this manuscript. Dr. Fuqua's perceptive comments and suggestions were greatly appreciated throughout the course of the study. I would also like to express appreciation to Ellen Sharenow for providing me with the benefit of her experience in conducting a prior study. A special thank-you goes to my assistant, George Renfrey, who spent many hours scoring videotapes. Without his dependable assistance and cheerful demeanor, this study would not have been possible. I would also like to thank Bernie Pinto and Sue Kellar for their technical assistance, support, and encouragement during the months that we shared laboratory space. Finally, my deepest appreciation goes to my family and friends for their love, understanding, and support throughout the last two years.

I would especially like to acknowledge the contribution of my wife and daughter, whose patience and many sacrifices have made it
possible for me to complete this study. I dedicate this thesis to them.

Gregory A. Wright
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A comparison of awareness training and competing response training in the treatment of muscle tics and nervous habits

Wright, Gregory Alan, M.A.
Western Michigan University, 1987
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CHAPTER I

INTRODUCTION

Muscle tics and nervous habits are behavior disorders that are persistent and highly resistant to traditional methods of treatment (Azrin & Nunn, 1973). Estimated to affect 1% of the population (Azrin & Nunn, 1977), muscle tics are characterized by involuntary motor movements and are distinct from spasms and tremors, which usually have an organic base (Yates, 1970). While the etiology of a particular muscle tic may be in organic impairment or disease, in a large percentage of cases there is no known organic cause.

Common nervous habits include fingernail biting, hair pulling (trichotillomania), and oral habits such as thumb sucking and bruxism. Yates (1958) proposed that some of these behaviors are learned responses that were originally evoked in highly traumatic situations. If a movement coincides with a reduction of the fear-inducing stimulus, it acquires strength through reinforcement. On subsequent occasions, conditioned fear (anxiety) may be aroused, then reduced, by performance of the movement. Through stimulus generalization, the behavior is then elicited by a large variety of stimuli and becomes a powerful habit.

A multicomponent habit reversal procedure developed by Azrin and Nunn (1973) has been shown to be effective in eliminating a variety of muscle tics such as head jerks, facial twitches (Azrin, Nunn, & Frantz, 1980a), and eye blinking (Finney, Rapoff, Hall, & Christo-
person, 1983). The procedure has also been used successfully to treat a diverse group of nervous habits such as fingernail biting (e.g., De L. Horne, & Wilkinson, 1980; Nunn & Azrin, 1976), hair pulling (Azrin, Nunn, & Frantz, 1980b; Rosenbaum & Allyon, 1981), and thumb sucking (Azrin, Nunn, & Frantz-Renshaw, 1980). With both muscle tics and nervous habits, the literature reports a dramatic reduction of the behavior for a large majority of subjects treated with habit reversal. For example, Azrin, Nunn, and Frantz (1980a) reported a 97% reduction in self-reports of tic frequency for 10 subjects. Ladouceur (1979) reported successful treatment of fingernail biting in a large number of subjects using several variations of the habit reversal procedure. Although many of these studies are characterized by methodological weaknesses, such as exclusive reliance on self-report data (e.g., De L. Horne & Wilkinson, 1980; Rosenbaum & Allyon, 1981) and a lack of reported inter-observer agreement (e.g., Azrin, Nunn, & Frantz-Renshaw, 1980), the consistent findings strongly suggest that habit reversal is a viable treatment for both muscle tics and nervous habits.

Azrin and Nunn (1973) hypothesized that habits persist because of response chaining, limited awareness, excessive practice, and social tolerance. Based on this hypothesis, the habit reversal procedure was developed with 10 separate components: (1) response description, (2) response detection, (3) early warning, (4) competing response practice, (5) situation awareness training, (6) habit inconvenience review, (7) social support, (8) public display, (9) generalization training, and (10) symbolic rehearsal. Because the procedure
includes multiple components, it is not clear which of the 10 components are responsible for its consistent effects in reducing and eliminating muscle tics and nervous habits. Identification of the necessary components would allow simplification of the habit reversal procedure and would increase the ease and reliability with which the procedure could be implemented. Also, identification of the behavioral principles would relate the habit reversal procedure to other bodies of literature based on the same principles.

Attempts to isolate the components of the habit reversal procedure have focused mainly on the components of competing response training and awareness training. Several researchers have examined the role of the competing response in habit reversal. For example, De L. Horne and Wilkinson (1980), using self-recorded measures of nail biting and nail length, reported that two simplified habit reversal programs that included a competing response produced greater effects than a program that lacked a competing response. Miltenberger and Fuqua (1985) found contingent competing response practice to be more effective than noncontingent competing response practice in the treatment of nervous habits, providing support for the position that punishment is the behavioral process responsible for the effects of the competing response. In addition, Sharenow (1985) determined that competing responses which were not topographically related to the specific habit were as effective in reducing muscle tics as competing responses which were topographically related to the tics, again suggestive of a punishment rationale.

The effect of awareness training has also been the subject of
empirical studies, often taking the form of comparisons between self-monitoring, a major element of the awareness training component, and habit reversal, which is generally a procedure that includes a competing response. Evidence indicates that awareness training alone may be an effective intervention in some cases. For example, Billings (1978) found that self-monitoring alone was effective in reducing both the frequency and intensity of muscle tics. Also, Ladouceur (1979) examined pre- and posttreatment ratings of the appearance of subjects' hands and found no difference among groups of nail biters implementing habit reversal, habit reversal plus self-monitoring, self-monitoring alone, and self-monitoring plus daily graphing. Additional support for the efficacy of awareness training is provided by Ollendick (1981), who reported that a self-monitoring plus competing response procedure was necessary for suppression of muscle tics in one subject, while self-monitoring alone was effective for the other subject.

Researchers have frequently used awareness training in conjunction with another habit reversal component. For example, Varni, Boyd, and Cataldo (1978) used an intervention consisting of awareness training, external reinforcement, and time out to decrease muscle tics in a hyperactive child. Also, Finney et al. (1983) used five of the basic habit reversal components in treating muscle tics. Their intervention included: (1) awareness training, to increase behavior detection skills and promote self-monitoring, (2) competing response training, to teach an incompatible response, (3) relaxation training, for reducing general muscle tension, (4) social support procedures,
to elicit support of family members and friends, and (5) habit inconvenience review, in which the client lists all of the negative aspects of the problem. Finally, Miltenberger, Fuqua, and McKinley (1985) found that the awareness training and competing response components used together were as effective as the entire 10-component habit reversal package in the treatment of muscle tics.

The results of these studies suggest that awareness training is an important part of the habit reversal procedure, but results appear to be inconsistent between patients and studies, and interpreting the role of awareness training from this evidence is difficult due to some weaknesses in the literature. First, the number of variations of habit reversal treatments employed makes direct comparisons between studies difficult. Also, many studies (e.g., Billings, 1978; Ollendick, 1981) are based on results from only one or two experimental subjects, thereby limiting the generality of the findings. Furthermore, in many cases (e.g., Ladouceur, 1979; Miltenberger et al., 1985) the effect of the awareness training component is confounded with another program element, a problem that provides the impetus for the present study.

The aforementioned body of research suggests that not all 10 components of the habit reversal procedure are necessary for it to be effective in suppressing muscle tics and nervous habits. This study will extend the research of Miltenberger et al. (1985), whose findings indicate that an intervention combining awareness training with competing response training is as effective as the entire habit reversal package. These researchers note the need to employ a dismantling
strategy to examine the two components of their simplified habit reversal procedure. The components of awareness training and competing response training are closely linked and often used together because prior to engaging in a contingent competing response the subject must be able to detect the occurrence of the tic or habit. Therefore, awareness training accompanies the competing response component, and the effects of the individual components are obscured. Those studies that have examined the two components independently (Ladouceur, 1979; MacNamara, 1972; Ollendick, 1981) suggest that awareness training may be responsible for a portion of the observed effect which is attributed to competing response training.

This study compares the effectiveness of awareness training alone with awareness training plus competing response training; such a study is necessary in order to eliminate a confound in previous studies and is important for both theoretical and practical reasons. A finding that awareness training is an effective intervention when presented by itself will suggest that the dramatic effects observed with habit reversal are due to factors other than the competing response. A finding that the competing response is an essential part of the simplified habit reversal program will support the position that punishment is the behavioral mechanism at work. Furthermore, identification of the necessary components of the habit reversal procedure will help in providing effective and efficient treatment for persons with muscle tics and nervous habits. The effects of the awareness training and competing response training interventions are compared in two experiments. In Experiment 1 subjects will be
treated for muscle tics. Subjects in Experiment 2 will be treated for nervous habits.
CHAPTER II

EXPERIMENT 1

Method

Subjects

Subjects were recruited through an article and classified advertisements in the local newspaper requesting volunteers for experimental treatment of muscle tics. Of five individuals who responded, two subjects were selected based on the presence of an observable muscle tic and their willingness to participate in the study. Three volunteers were excluded from the study because their presenting conditions did not appear to be muscle tics.

The subjects were randomly assigned to one of two independent variable conditions. Subject 1 was assigned to the competing response training (CR) condition and Subject 2 to the awareness training (AT) condition. Subject 1, a 27-year-old married woman in good health, had a facial twitch of the muscle on the cheek, directly to the right of her nose. The tic occurred two to four times each minute, with onset in adolescence, and had been absent only for brief periods since that time. She had previously sought medical advice, practiced relaxation, and had applied tape to the area in unsuccessful attempts to eliminate the tic. Subject 1 was unemployed at the time the study began and took a job during the course of treatment. Subject 2, a 45-year-old married man in good
health, had a rapid and fluttering eyeblink accompanied by an eye-brow twitch. The onset of both tics was about two years prior to treatment, when he had experienced a great deal of stress at work. This subject was unemployed at the time of the study and had not taken any other measures to alleviate the problem.

Setting

Experimental sessions for Subject 1 were conducted in a clinical laboratory affiliated with the Psychology Department of Western Michigan University, Kalamazoo. A graduate student in psychology served as the therapist, meeting with subjects in a 3.5 m x 5 m room furnished with office furniture and videotape equipment. Sessions with Subject 2 were conducted by the same graduate student in the living room of the subject's home, with the same videotape equipment present.

Dependent Variables and Data Collection Procedures

Dependent variables consisted of the percent of intervals in which muscle tic behaviors were detected in videotaped observations. Subjects were videotaped during observation sessions lasting 15 to 30 minutes each. During all observation sessions the subjects sat and talked with the therapist, briefly reviewed progress, and discussed unrelated topics. Observations were conducted during baseline and after treatment 3 to 5 times per week for 4 to 8 weeks and at 1-week, 3-week, and 12-week follow-up sessions. The videotapes were scored by a graduate student naive to the experimental condi-
tions, using a six-second partial interval scoring method (Bailey & Bostow, 1979). A muscle tic was recorded if it occurred in that interval and matched the response definition listed in Table 1. For the rapid eyeblink response of Subject 2, only those intervals in which more than three blinks occurred were scored as tic behavior.

Muscle tic definition for Subjects 1 and 2 and their respective competing responses are listed in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Subject</th>
<th>Definition</th>
<th>Competing Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject 1</td>
<td>Facial Twitch - a sharp upward movement of the cheek directly to the right of the nose</td>
<td>Tighten right cheek muscle</td>
</tr>
<tr>
<td>Subject 1</td>
<td>Rapid Eyeblink - more than 3 eyeblinks within a 6-sec. observation period</td>
<td>Open eyes wide, blink at 5-sec.</td>
</tr>
<tr>
<td>Subject 2</td>
<td>Eyebrow Twitch - a sharp, downward movement of the eyebrow</td>
<td>Raise eyebrows, blink at 5-sec.</td>
</tr>
</tbody>
</table>

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Interobserver Agreement

Twenty-five percent of the videotapes were randomly selected and independently scored by a second observer. Interobserver agreement scores for the interval data were determined by dividing the number of intervals on which the observers agreed on the occurrence or non-occurrence of the defined behavior by the number of intervals on which agreements occurred plus the number of intervals on which disagreements occurred and multiplying by 100%. Interobserver agreement scores ranged from 81.3% to 100%, with an average of 88.8%.

Experimental Design

Experiment 1 utilized a mixed design with a multiple baseline across behaviors and reversal. Following an initial baseline phase, Subject 1, with one tic behavior, received the CR intervention. Subject 2, with two tic behaviors, initially received the AT intervention for one behavior following baseline and later received the CR component for that behavior. This same procedure was repeated for the second tic behavior of Subject 2 in a multiple baseline across behaviors design.

Procedure

Baseline

Each subject met individually with the student therapist. At the first session the therapist described the program, had informed
consent forms signed, and collected assessment information. Subjects were videotaped in four to six baseline sessions during which they sat and talked with the therapist. These baseline observation sessions were used to develop a response definition and treatment strategy for each muscle tic. Subjects were told to refrain from trying any procedures to alter their tics until instructed to do so and then to use only the prescribed intervention.

Awareness Training

Awareness training was conducted in one 90-minute session. A rationale for the AT intervention was presented to the subject that emphasized the control which results from increased awareness and self-monitoring. In an attempt to create a high expectancy for improvement, the intervention was described as a variation of a habit reversal procedure that has been shown to be effective with problems similar to that of the subject. The subject received one treatment session consisting of the AT component of the habit reversal package (Finney et al., 1983). This included response description activities in which the subject was given a definition of the tic, repeated the definition three times, and viewed the tic in a portion of his baseline videotape. The subject was then instructed to identify tic behaviors occurring on the videotape, with prompts provided by the therapist until detection at a criterion rate of 80% was demonstrated. Next the subject was instructed to identify tics occurring during the actual treatment session. Therapist prompts were provided until the subject was able to reliably detect tic behaviors as they
occurred at a criterion rate of 80%. To minimize disruption of on-going activities, a hand-held light was used at that point to signal each occurrence of the tic. The detection exercise was videotaped, and a performance rating was later computed by determining the percentage of tic behaviors that were detected as indicated by the subject's signalling with the light. The detection exercise was conducted until the criterion level was demonstrated, or for 10 minutes if the subject was not able to reach criterion.

The AT subject was provided with 3 x 5 in. cards for data collection, one for each day until the next observation session, and was instructed in their use. The subject was instructed to record each occurrence of the muscle tic for two hours each day during a high frequency time block, to be determined by the subject, and to deliver the completed cards to the therapist at subsequent observation sessions. At the end of the training session, an instruction sheet was provided that included the definition of the problem behavior and described the recording instructions.

**Competing Response Training**

A rationale for the CR intervention was presented that emphasized increased awareness, strengthening opposing muscles, and interrupting the pattern of the problem behavior. The intervention was described as being effective with problems similar to that of the subject, in an attempt to create a high expectancy for improvement. The CR subject initially received the same awareness training procedure as detailed above for the AT intervention. In addition,
she received the competing response training component of the habit reversal procedure as described by Finney et al. (1983). A competing response was prescribed for each behavior that was designed to be incompatible with the particular tic, as described in Table 1. The subject was instructed to engage in the competing response for three minutes following tics that occurred both during the session and throughout her daily activities. The subject was also instructed to record both the performance of the competing response and the occurrence of the tic behavior on the 3 x 5 in. cards. This provided an assessment of the extent to which the subject was adhering to the treatment protocol. At subsequent observation sessions, the subject delivered the 3 x 5 in. cards to the therapist, discussed problems, and was encouraged to adhere to the program and maintain accurate recording. The subject was instructed to record for two hours each day during a high frequency time period, as determined by the subject but to be the same block of time each day. At the end of the training session, an instruction sheet was provided that included the definition of the problem behavior and the competing response, outlined the prescribed activity, and described the recording instructions.

Posttreatment Observation Sessions

Following the initial treatment session, Subjects 1 and 2 attended 11 and 27 sessions respectively, during which videotaped observations were made. At each 30- to 40-minute session, progress was reviewed briefly, and other topics were discussed for the remain-
der of the session. To provide an opportunity to compare self-recorded data with videotaped observations, subjects were requested to record the occurrence of their tics and performance of their competing responses during observation sessions.

**Consistency of the Independent Variables**

Three different strategies were used to assess or ensure the integrity of the independent variables (Peterson, 1982). First, a written outline was followed during AT and CR interventions to ensure the consistency of the treatments across subjects. Second, self-report data were analyzed to determine the extent to which the CR intervention was applied as intended. As subjects reported both the frequency of the problem behavior and the performance of the competing response, the percentage of muscle tics followed by the competing response served as an indication of the extent to which subjects adhered to the treatment protocol.

Finally, an assessment was conducted of each subject's ability to detect the occurrence of his or her muscle tic. Response detection trials were videotaped and results computed from later observations. The subjects' scoring of muscle tics using a hand-held light as a signal was compared with independent scoring of the muscle tics from the videotapes. Percentages were determined by dividing the percentage correct by the percentage correct plus false positives and false negatives.
Expectancy Effects

An attempt was made to equalize expectancy effects for each intervention (Kazdin, 1979) by presenting a plausible rationale for each intervention and describing both as effective variations of the same treatment procedure. At the end of the treatment session, each subject was requested to rate his or her level of expectancy for treatment gains on a Likert-type scale (Borkovec & Nau, 1972; McGlynn & McDonnel, 1974). Values ranged from 1 to 10, with 1 representing the least expectation for improvement and 10 representing the most expectation for improvement.

Follow-Up

Follow-up observations were conducted for each subject at one week and three weeks after termination of treatment, with an additional session scheduled for the twelfth week following termination of treatment. Follow-up sessions included the same activities as posttreatment observation sessions.

Consumer Satisfaction

At the termination of active treatment, subjects were requested to complete a questionnaire regarding their satisfaction with the treatment and their assessment of improvement. Eight questions were answered using a Likert-type scale.
Social Validation

To aid in assessing therapeutic gains in regard to the eyeblink behavior of Subject 2, a comparison group of 3 persons who disavowed muscle tics involving eyeblinking was used to establish a normative percentage of six-second intervals containing more than three eyeblinks. The individuals in the comparison group were videotaped in 20-minute sessions without having knowledge of the behavior of interest. Data were then scored using the same six-second interval procedure as described in the section on data collection. The average percentage of rapid blinking for the comparison group was 22%. This percentage is represented by the horizontal dotted line at the 22% level in Figure 1.

Results and Discussion

The results for Experiment 1 are depicted in Figure 1. Mean percentage levels of six-second intervals were computed by averaging data from all observation sessions in each phase, except for the eyebrow twitch behavior of Subject 2 in which case the last 10 sessions were used to compute the baseline level.

Figure 1 shows that Subject 1, with a facial twitch, experienced an immediate cessation of her tic with the CR intervention. The behavior decreased from a baseline mean of 20.5% of observed intervals to less than 1% in the CR phase. She reported that her tic occurred only three or four times following intervention and remained at a zero level at 1-week, 3-week, and 12-week follow-up.
Figure 1. Muscle Tic Data for Subjects 1 and 2 of Experiment 1.
Subject 2 was treated for two muscle tics, rapid eyeblinking and an eyebrow twitch. Because this subject did not achieve total elimination of rapid eyeblinking with AT alone, the CR intervention was later introduced. The same procedure was then applied to the subject's eyebrow twitch in a multiple baseline across subjects design. Subject 2's rapid eyeblinking decreased from a mean of 80.2% of six-second intervals in baseline to 38.9% with AT. A further decrease in rapid blinking to a mean percentage of 31.3% of intervals was observed in the competing response phase, and then, with a shift of treatment to the eyebrow twitch, an increase to 69.4% in a reversal phase. On the same measure of rapid blinking, the 3-person comparison group without rapid blinking showed a mean of 22% of six-second intervals, with a range of 7.3% to 32%. Follow-up observations for Subject 2 showed an elevated percentage of rapid blinking at Week 1 and only a small improvement from baseline at Week 3. The second behavior for Subject 2, the eyebrow twitch, showed an interdependency with rapid blinking. When awareness training was introduced for eyeblinking, the eyebrow twitch decreased from an early baseline mean of 70.5% of intervals to a mean of 18.4% of intervals. From this lower baseline level, eyebrow twitches then increased to a mean of 21.6% of intervals in the AT phase and increased further to 25.5% of intervals with the CR intervention. At the 1-week follow-up, this behavior had also returned to pretreatment level, while a sharp decline to 11% of intervals was observed at 3-week follow-up.
Consumer Satisfaction

The results of the treatment satisfaction questionnaire are presented in Table 2. Both subjects reported general satisfaction with the treatment, with Subject 1 reporting complete elimination of the problem behavior. However, Subject 2 reported a lower level of satisfaction and also reported muscle tic activity that continued to be slightly uncomfortable and noticeable.

Consistency of the Independent Variables

The extent to which subjects adhered to the prescribed treatment activity with respect to the competing response was assessed through an analysis of the self-report data. During the CR phase, each subject reported consistent application of the competing response outside of the clinical setting. According to the self-report data of Subject 1, 100% of tic behaviors were followed by a competing response. Subject 2 reported a range of 66% to 100%, with a mean of 98%; however, Subject 2 reported a much lower frequency of tic behaviors, ranging from 0 to 54 per hour, than was observed in clinical observations, which ranged between conservative estimates of 60 to 300 per hour for the eyebrow twitch and 150 to 3000 per hour for the rapid eyeblink. This discrepancy suggests that a large number of tics were not followed by the competing response. It should also be noted that Subject 2 reported that observation sessions evoked a high rate of tic behavior, presenting the possi-
Table 2
Mean Ratings on Treatment Satisfaction Questionnaire

1. Please rate how satisfied you are about your progress.

<table>
<thead>
<tr>
<th>Very Dissatisfied</th>
<th>Dissatisfied</th>
<th>Neutral</th>
<th>Satisfied</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>□</td>
</tr>
</tbody>
</table>

2. As a result of the treatment program, I am experiencing my tic/habit:

<table>
<thead>
<tr>
<th>More than before treatment</th>
<th>Same as before treatment</th>
<th>Less than before treatment</th>
<th>Much less than before treatment</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>□</td>
</tr>
</tbody>
</table>

3. Before treatment my tic/habit distressed me:

<table>
<thead>
<tr>
<th>Very much</th>
<th>Much</th>
<th>Not much</th>
<th>Very little</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

4. After receiving treatment, my tic/habit distressed me:

<table>
<thead>
<tr>
<th>Very much</th>
<th>Much</th>
<th>Not much</th>
<th>Very little</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

5. Before treatment, being around other people made me feel:

<table>
<thead>
<tr>
<th>Very uncomfortable</th>
<th>Uncomfortable</th>
<th>Slightly uncomfortable</th>
<th>Neutral</th>
<th>Not uncomfortable at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>□</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

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Table 2. Continued

6. After receiving treatment, being around other people makes me feel:

<table>
<thead>
<tr>
<th>Very uncomfortable</th>
<th>Uncomfortable</th>
<th>Slightly uncomfortable</th>
<th>Neutral</th>
<th>Not uncomfortable at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

7. Before treatment, I think my tic/habit was distracting to other people.

<table>
<thead>
<tr>
<th>Very much</th>
<th>Much</th>
<th>Not much</th>
<th>Very little</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

8. After receiving treatment, I think my tic/habit is distressing to other people:

<table>
<thead>
<tr>
<th>Very much</th>
<th>Much</th>
<th>Not much</th>
<th>Very little</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

- Competing Response Training
- Awareness Training

bility that self-reports were accurate even though the frequency reported was substantially lower than that observed in sessions.

Using the light to signal detection of a tic, Subject 1 was able to detect 88% of facial twitches in one 20-minute awareness training session. In one 10-minute trial, Subject 2 was able to detect rapid eyeblinks (less than 3 seconds from the previous blink) at a rate of
51%, a rate below the criterion rate of 80%. In subsequent booster sessions, detection of rapid blinking for this subject again fell below the criterion level, scoring at 50% and 55% on two trials; however, when asked to detect every eyeblink, not only those with an inter-response time of less than 3 seconds, Subject 2 was able to detect 93% on one trial. In regard to the eyebrow twitch, Subject 2 was able to detect only 33% on one trial of 20 minutes.

**Expectancy Effects**

Both subjects rated their expectation for improvement to be very high, indicating that the AT and CR interventions were both highly credible interventions. The generally equal expectation for improvement with each intervention helps to rule out differences in the observed results which may be attributable to differing levels of expectancy.

The results of Experiment 1 indicated that both the CR intervention and the AT intervention were effective in reducing muscle tics. The effectiveness of AT alone with Subject 2 suggests that awareness training may be responsible for a large part of the effect observed with habit reversal. It should be noted also that there appeared to be an additive effect with the introduction of CR to AT for Subject 2's eyeblink response; however, the results for Subject 2 were transient, making interpretation difficult, and the small number of subjects limits the subject generality. In an attempt to replicate the results of Experiment 1 with another response class, subjects with nervous habits were recruited for a second experiment that involved a
comparison of awareness training and awareness training plus competing response training.
CHAPTER III

EXPERIMENT 2

Method

Subjects

Two subjects were recruited through newspaper advertisements requesting volunteers for experimental treatment of nervous habits. Subjects were randomly assigned to treatment conditions: Subject 3 to awareness training (AT) and Subject 4 to competing response training (CR). Subject 3 was a 27-year-old married male graduate student with a habit of fingernail biting since childhood. He reported being in good health and that he had once tried without success to eliminate his habit by self-recording during certain high frequency time periods. Subject 4 was a 22-year-old single female college student in good health. She had a habit of fingernail biting since age 7. Subject 4 also reported pulling the hair from the outer half of both eyebrows, a nervous habit that had been present for several years. She had previously tried applying fingernail polish to her nails in an unsuccessful attempt to eliminate nail biting. In addition to the CR intervention for nail biting, Subject 4 simultaneously received AT for eyebrow pulling.

Setting

All sessions were conducted in an outpatient clinic affiliated
with the Psychology Department of Western Michigan University as described in Experiment 1.

**Dependent Variables and Data Collection**

Dependent variables consisted of the self-reported frequency of the behaviors of fingernail biting and eyebrow pulling. Attempts to videotape the nervous habits of the subjects at the initial treatment session were unsuccessful, as the habits were not exhibited spontaneously at those times. It was necessary to use subjects' estimates of habit frequency as baseline measures because self-recording, the usual method of collecting baseline data with nervous habit behaviors, is itself a major element of the AT intervention and could not be a part of the baseline condition. After baseline subjects recorded each occurrence of the habit behavior on 3 x 5 in. cards that were carried throughout the day. Subjects were instructed to record each occurrence of the habit immediately to help ensure the accuracy of the data. Daily recording cards were provided, and instructions were given to deliver the completed cards to the therapist when attending observation sessions. In an attempt to corroborate the self-report data, measurements of fingernail length were taken at each session. Photographs of the hands were taken at these times plus photographs of the eyebrows of Subject 4. The general appearance of the eyebrows at various stages of treatment was rated by six disinterested persons using a Likert-type scale. Values ranged from 1 to 5, with 1 representing thin and wispy eyebrows and 5 represent-
ing thick and full eyebrows. Nervous habit response definitions and their respective competing responses are listed in Table 3.

Table 3
Nervous Habit Definitions and Competing Responses

<table>
<thead>
<tr>
<th>Subject</th>
<th>Definition</th>
<th>Competing Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject 3</td>
<td>Fingernail Biting - any biting of a single fingernail</td>
<td>None</td>
</tr>
<tr>
<td>Subject 4</td>
<td>Fingernail Biting - any biting of a single fingernail</td>
<td>Clench fist</td>
</tr>
<tr>
<td></td>
<td>Eyebrow Pulling - any pulling of the hair of the eyebrows</td>
<td>None</td>
</tr>
</tbody>
</table>

**Experimental Design**

A repeated AB design was used in Experiment 2. Subject 3, with a nail biting habit, received the AT intervention following a baseline estimate of the frequency of the habit. Subject 4, with two nervous habits, received the CR intervention for nail biting and simultaneously received the AT intervention for the eyebrow pulling habit.
Procedure

Baseline

Each subject met individually with the same student therapist as in Experiment 1 and followed the same general procedure as in the first experiment. At the initial session, subjects were videotaped for 30 minutes during which they sat and talked with the therapist. Because the habits were not exhibited spontaneously during videotaping, subjects were asked to demonstrate the habit for later response definition and detection activities.

Awareness Training

The intervention was administered immediately following baseline activities in one 90-minute session. The subject received the same AT intervention as described in Experiment 1, including response detection and response description activities; however, because habits were not exhibited at the initial observation session, response detection activities were modified for nervous habit subjects. The subject viewed the demonstrated habit behavior on videotape and was then instructed in identifying and recording habit behaviors. The AT subject was instructed to carry 3 x 5 in. cards throughout the day and to record each occurrence of the defined response.

Competing Response Training

All aspects of the CR intervention were the same as in Experiment 1, including the same AT activities as described above plus a
contingent competing response activity. A competing response was prescribed for each behavior that was designed to be incompatible with the habit response, as described in Table 3. The subject was instructed to engage in the competing response for 3 minutes, contingent on the occurrence of the habit, beginning immediately, and to perform the competing response whenever the habit occurred throughout the day.

Posttreatment Observation Sessions

Subjects attended four 30-minute observation sessions subsequent to treatment, during which progress was reviewed and corroborating measurements and photographs taken. Follow-up sessions were scheduled for 1, 3, and 12 weeks after termination of treatment.

Consistency of the Independent Variables

Two strategies were used to assess or ensure the integrity of the independent variables (Peterson, 1982). A written outline was followed during AT and CR interventions to ensure the consistency of treatment across subjects. Both subjects demonstrated detection and recording skills and performed the competing response (if applicable) during the training sessions. However, awareness training activities were limited to detection of demonstrations of habits on videotape. Also, self-report data were analyzed to determine the extent to which the CR intervention was applied as intended. With subjects reporting both the occurrence of the habit behavior and the performance of the competing response, the percentage of behaviors that were followed by
the competing response served as an indication of the extent to which subjects adhered to the treatment protocol.

**Expectancy Effects**

An attempt was made to equalize expectancy effects for each intervention (Kazdin, 1979), as described in Experiment 1. At the end of the treatment session, each subject was requested to rate his or her level of expectancy for treatment gains on a Likert-type scale (Borkovec & Nau, 1972; McGlynn & McDonnel, 1974). Values ranged from 1 to 10, with 1 representing the least expectation for improvement and 10 representing the most expectation for improvement.

**Follow-Up**

Follow-up observations were conducted for all subjects at 1 week and 3 weeks after termination of treatment, with an additional session scheduled for 12 weeks. Follow-up sessions included the same activities as posttreatment observation sessions.

**Consumer Satisfaction**

At the termination of treatment, subjects were requested to complete a questionnaire regarding their satisfaction with the treatment, as described in Experiment 1.

**Results**

The results for Experiment 2 are displayed in Figure 2. Subject 3 exhibited a rapid decrease in fingernail biting with the AT
Figure 2. Nervous Habit Data for Subjects 3 and 4 of Experiment 2
intervention, declining from a baseline estimate of 5 times per day to a self-report rate of 1.1 times per day over a 3-week period. A rate of zero was reported at the 1-week follow-up and rose to one time per day at the 3-week follow-up. Self-report data of Subject 3 were supported by measures of fingernail length, with the mean nail length increasing from 9.2 mm at baseline to 11.6 mm at Day 18 when therapy was terminated. Mean nail length was 12.4 mm at the 1-week follow-up session and 12.9 mm at 3 weeks posttreatment.

Two behaviors were treated simultaneously in Subject 4, fingernail biting and eyebrow pulling. The first behavior was treated using the CR intervention and the second with AT alone. From a self-reported baseline estimate of nine times per day, nail biting decreased to zero within five days with the CR intervention. Eyebrow pulling decreased from a baseline estimate of 30 times per day to zero within six days with the AT intervention alone. Both behaviors remained at a zero level at 1-week and 3-week follow-up. Self-report data of Subject 4 were supported by measurements of fingernail length, with an increase from 7.9 mm at baseline to 10.1 mm at Day 18. Mean length was 11.1 mm at 1-week follow-up and 12.1 mm at 3-week follow-up. The ratings of the photographs of the eyebrows of Subject 4 provided evidence that the general appearance had improved, with posttreatment eyebrow photos rated at a mean of 4.6, indicating a fuller and thicker appearance than pretreatment photos, which were rated at a mean of 1.8.
Consumer Satisfaction

Consumer satisfaction ratings are presented in Table 2. Both subjects reported high levels of satisfaction with the treatment procedure.

Consistency of the Independent Variables

The extent to which subjects adhered to the treatment protocol with respect to application of the competing response was computed as in Experiment 1. The proportion of responses which were reportedly followed by the competing response was determined to be 94% for Subject 4's fingernail biting. The other target behaviors were treated with awareness training alone.

Expectancy Effects

Both subjects rated their expectation for therapeutic gains to be very high with their respective treatments, indicating that both AT and CR were credible interventions in Experiment 2. The generally equal expectation for improvement with each intervention helps to rule out differences in the observed results which may be attributable to differing levels of expectancy.
CHAPTER IV

GENERAL DISCUSSION

The results of this study indicate that both the CR and AT interventions had a substantial treatment effect. The implications for the component analysis of the habit reversal procedure are that effects attributed to the competing response component may be partly due to the awareness training component.

These results support and extend those of Miltenberger et al. (1985), replicating the efficacy of a simplified habit reversal procedure utilizing the AT and CR components. Evidence suggests that the CR intervention was slightly more effective than the AT intervention alone, with Subjects 1 and 4 attaining total suppression of their tic or habit with the competing response intervention. In addition, Subject 2 achieved the best results in decreasing rapid eyeblinking with the addition of the CR to the AT intervention, although the results for this subject are complicated by a sequence effect. While the effectiveness of AT was demonstrated with Subjects 2, 3, and 4, Subject 4 was the only one to report total suppression with AT alone.

The finding that awareness training alone had a substantial effect is consistent with previous reports of the efficacy of self-monitoring in reducing muscle tics and nervous habits (Ladouceur, 1979; MacNamara, 1972; Ollendick, 1981). Subjects 3 and 4 achieved satisfactory results with awareness training alone, and Subject 2
showed the greatest gains in both behaviors with the introduction of AT for the rapid eyeblink response. The interdependency between the two tics of Subject 2 was likely the result of greater awareness of the eyebrow twitch due to increased attention to the eyes in general.

Eyeblinking appears to be an especially difficult behavior to control, partly because it is a behavior that is physiologically necessary and cannot be eliminated entirely. The therapeutic goal, therefore, is to slow the blinking to a normal rate. In light of the data from the comparison group, it appears that the intervention resulted in some improvement in the eyeblinking of Subject 2, but not to the therapeutic goal as determined by the normative sample.

There are several possible explanations for the failure of the intervention to totally suppress the tics of Subject 2. Generally, the literature reports greater success in eliminating low-frequency than high-frequency muscle tics. Also, because the tics occurred at a very high rate, the subject reported difficulty in adhering to the prescribed competing response at all times. The lack of a contingent relationship between the eyeblink tic and the competing response practice may have limited the intervention's effectiveness. This is supported by therapist observations in sessions with Subject 2. Another possibility is that rapid blinking or eyebrow twitches were not detected, and therefore the competing response was not performed. This explanation is supported by awareness training detection data which show that, even with a high level of concentration, about one-half of rapid blinks and two-thirds of eyebrow twitches were not detected. However, the failure to totally eliminate the eyeblink and
eyebrow twitch is similar to results from previous studies (Miltenberger et al., 1985; Sharenow, 1985) and suggests that these behaviors are not particularly amenable to treatment with a simplified habit reversal program. Perhaps a more comprehensive habit reversal package would be more effective in these cases.

The results of this study are generally consistent with those of the literature but should be interpreted cautiously. The small number of subjects in each experiment prevented statistical analysis of the data and limits the generality of the findings. That similar results were attained with nervous habits as with muscle tics is reassuring and suggests that the findings may have wider generality. A comprehensive study of the effects of awareness training in habit reversal will be required to support the present conclusions. Other limitations of the study include possible sequence effects with Subject 2 and reliance on self-report data in Experiment 2.

Questions about the integrity of the independent variables present additional limitations. While one muscle tic subject was able to detect tics at a criterion rate of 80%, the other was not. Furthermore, it is not clear that awareness training actually had any effect on detection skills, as pretreatment measures of detection were not taken. Additionally, the discrepancies observed between self-report data and clinical observations of tic frequency for Subject 2 leave doubt about the consistency of the application of the CR intervention. Even during observation sessions, it was difficult to determine the extent to which the subject engaged in the competing response, as competing responses involved normal muscle movements.
Despite these limitations, the results of the study suggest some tentative conclusions. First, the comparison between the two interventions indicated that the intervention containing the competing response may be more effective than awareness training alone. Second, it appears that awareness training alone may be an effective intervention for some individuals, possibly those with nervous habits or low-frequency muscle tics. Furthermore, the results suggest that the AT component of the habit reversal procedure may be responsible for a large part of the effects which have been attributed to the CR component.

The behavioral mechanism(s) responsible for the effects of awareness training in habit reversal have been examined by MacNamara (1972) and Ollendick (1981). Effects are thought to be primarily due to increased awareness and control engendered by the self-monitoring process. While self-recording is a common element, most awareness training interventions appear to include various activities designed to focus attention on the problem behavior, with the presumption that activities have some effect on awareness. Yet only a few studies (e.g., Miltenberger et al., 1985; Sharenow, 1985) reported conducting a test of subjects' ability to detect the target behaviors. This highlights some problems with this independent variable (Peterson, 1982). It appears that activities involved in awareness training vary widely between studies, with insufficient detail regarding component activities making replication and direct comparisons between studies difficult. Also, there is little evidence that awareness training has any effect on detection abilities or any other
objective measure of awareness. With the lack of a clear definition of awareness training or objective evidence of its effects, it is not surprising that many researchers (e.g., Ladouceur, 1979; MacNamara, 1972; Ollendick, 1981) attribute its effect to nonspecific factors. Awareness training is frequently confounded with nonspecific factors associated with participation in the study, clinical assessment, therapist contact, etc. It may be productive in conducting a component analysis of habit reversal to focus on self-recording activities as a major subset of awareness training. At the same time, consideration should be given to nonspecific factors that may affect this or other components of the treatment package.

Among the nonspecific factors thought to contribute to the effectiveness of the awareness training intervention in this study is the expectancy effect (Kazdin, 1979; Kazdin & Wilcoxon, 1976). Both the AT and CR interventions were rated by subjects as being highly credible treatments, i.e., subjects had a high expectancy for improvement. Kazdin (1974) has noted that self-monitoring results in reactive changes, usually in a therapeutic direction. This would suggest a decrease in baseline levels as a function of self-recording and has implications for therapeutic use of self-recording in habit reversal. Initiation of self-recording without creating an expectancy for improvement may limit the therapeutic value of this activity and may even serve to inoculate the subject against future gains which could be derived from self-recording/awareness training activities.

The behavioral mechanism(s) responsible for the effects of the
awareness training component of the habit reversal procedure remain unclear at present. A comprehensive investigation will be required to clarify the role of awareness, i.e., the ability to detect the occurrence of habits and tics. This would require taking pretreatment measures of detection skills, shaping to criterion, and comparing the effectiveness of habit reversal with subjects at various skill levels. Also, the role of self-recording appears to be important to the effects observed with awareness training. In some respects, the behaviors associated with self-recording are similar to those involved with a competing response, e.g., they are effortful, often incompatible with the target behaviors, and are performed contingent on the problem behavior. An investigation of awareness training with and without self-recording activities would help to isolate the effects of self-recording and help to identify the behavioral mechanism responsible for the effects of awareness training.

Until more is known about the factors necessary to render awareness training an effective intervention, it is recommended that the CR component be included with awareness training.


